

THE LARGE INTESTINAL ROUNDWORM

(ASCARIS LUMBRICOIDES LINNAEUS)

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BACKGROUND: ASCARIS LUMBRICOIDES, THE LARGEST NEMATODE INTESTINAL PARASITE OF MAN, IS ON A WORLDWIDE BASIS THE MOST COMMON AND COSMOPOLITAN OF NEMATODES WHICH PARASITIZE MAN. A. LUMBRICOIDES IS FOUND THROUGHOUT THE TROPICS AND IN MOST OF THE TEMPERATE ZONES OF THE WORLD, EXCEPT IN AREAS WHICH ARE CONSISTENTLY COLD AND DRY.

THE FLORIDA DEPARTMENT OF HEALTH AND REHABILITATIVE SERVICES REPORTS 2% A. LUMBRICOIDES INFECTIONS FROM SPECIMENS SUBMITTED FOR INTESTINAL PARASITE DIAGNOSIS. EGGS HAVE BEEN RECOVERED FROM ROUTINE SOIL SAMPLES RECEIVED AT THE BUREAU OF NEMATOLOGY LABORATORY. THE POSSIBILITY OF ACQUIRING AN INFECTION FROM HANDLING CONTAMINATED SOIL SHOULD BE A MATTER OF CONCERN TO ANYONE WHO WORKS IN DIRECT CONTACT WITH THE SOIL.

GROSS MORPHOLOGY: MATURE FEMALES ARE WHITE, CREAM, OR PINK, 20-40 CM (8-15 INCHES) LONG BY 3-6 MM WIDE AND TAPERED AT EACH END. THE HEAD HAS 3 LIPS AND THE GENITAL OPENING IS 1/3 OF THE BODY LENGTH FROM THE HEAD.

MATURE MALES HAVE A SIMILAR APPEARANCE BUT ARE SHORTER AND NARROWER, 15-30 CM BY 2-4 MM, AND HAVE A CURVED TAIL WHICH IS MORE SLENDER.

THE EGGS ARE SMALL AND OF 3 TYPES: FERTILIZED, UNFERTILIZED AND DECORTICATED. FERTILIZED EGGS ARE COVERED WITH A TOUGH PEBBLED OUTER SHELL. SIZE: 45-75 X 35-50 MICRONS. UNFERTILIZED EGGS HAVE THE SAME GENERAL APPEARANCE BUT ARE LONGER AND NARROWER. SIZE: 84-94 X 39-44 MICRONS. DECORTICATED EGGS HAVE LOST THE PEBBLED OUTER SHELL. THEY MAY BE FERTILIZED OR UNFERTILIZED.

LIFE CYCLE AND BIOLOGY: NATURAL HOSTS, IN ADDITION TO MAN ARE THE CHIMPANZEE, GORILLA, GIBBON AND RHESUS MONKEY. THE LIFE CYCLE IN MAN BEGINS WHEN AN INFECTIVE EGG IS SWALLOWED AND PASSES THROUGH THE STOMACH TO THE SMALL INTESTINE. LARVAE EMERGE FROM THE EGG, PENETRATE THE INTESTINAL WALL, AND ENTER THE BLOOD AND LYMPH VESSELS OF THE INTESTINAL WALL. THEY MIGRATE THROUGH THE LIVER AND HEART TO THE LUNG CAPILLARIES, AND PENETRATE INTO THE LUNG AIR SPACES. THEY MIGRATE UP THE BRONCHIAL PASSAGES, ARE COUGHED UP AND SWALLOWED. THE LARVAE PASS BACK THROUGH THE STOMACH TO THE SMALL INTESTINE WHERE THEY MOLT INTO THE ADULT STAGE.

ABOUT 2 1/2 MONTHS AFTER THE ORIGINAL EGG HAS BEEN SWALLOWED, THE MATURE FEMALE WILL BEGIN DISCHARGING UP TO 200,000 EGGS A DAY. EGGS ARE VOIDED IN THE FECES. EGGS REQUIRE A PERIOD OF TIME IN THE EXTERNAL ENVIRONMENT TO ALLOW THE EMBRYO TO FULLY DEVELOP INTO AN INFECTIVE STAGE. SUFFICIENT SHADE, MOISTURE, OXYGEN, AND TEMPERATURES BETWEEN 60-98 F ARE NEEDED. THE CYCLE IS COMPLETE WHEN ONE OF THE INFECTIVE EGGS FINDS ITS WAY INTO THE MOUTH AND IS SWALLOWED.

SYMPTOMS AND PATHOLOGY: INFECTED CHILDREN ARE MORE COMMONLY AND SERIOUSLY AFFECTED THAN ADULTS. THEY TEND TO BE PHYSICALLY LESS DEVELOPED AND MENTALLY LESS ALERT. COUGHING AND FEVER (103-105 F) COMMONLY OCCURRING WITHIN 5 DAYS OF SWALLOWING AN EGG MAY MIMIC SYMPTOMS OF ATYPICAL PNEUMONIA.

PAIN IN THE UMBILICAL REGION IS THE MOST COMMON COMPLAINT. ADDITIONAL SYMPTOMS ARE DEBILITY, WEIGHT LOSS, ABDOMINAL TENDERNESS AND SWELLING, DIARRHEA OR CONSTIPATION, NAUSEA, AND PNEUMONITIS. MATURE WORMS MAY BE VOMITED OR CRAWL FROM THE NOSE OR RECTUM. ALTHOUGH ADULT WORMS NORMALLY FEED ON THE INTESTINAL CONTENTS, IT IS BELIEVED THAT THEY WILL SOMETIMES PUNCTURE THE INTESTINAL WALL TO FEED ON BLOOD. PERITONITIS CAN RESULT. A BOLUS OF WORMS CAN CAUSE INTESTINAL BLOCKAGE. TOXEMIC REACTIONS OCCURRING FROM ABSORPTION OF THE METABOLIC BY-PRODUCTS OF ADULT AND LARVAL WORMS MAY CAUSE INSOMNIA, TWITCHING, RESTLESSNESS, BRONCHIAL ASTHMA, CONJUNCTIVITIS, SKIN RASH, BLOODY URINE, AND SENSITIVITY TO LIGHT.

MIGRATING LARVAE CAN LODGE IN THE BRAIN, EYEBALL, SPINAL CORD, OR KIDNEYS AND CAUSE MILD OR SEVERE REACTIONS. DEATH HAS OCCASIONALLY BEEN RECORDED FROM INTESTINAL OBSTRUCTION.

EPIDEMIOLOGY: HUMANS BECOME INFECTED BY SWALLOWING EGGS CONTAINING FULLY DEVELOPED EMBRYOS WHICH HAVE BEEN ACCIDENTALLY PICKED UP FROM SOIL CONTAMINATED WITH HUMAN FECES. EGGS CAN BE PICKED UP FROM FOOD OR OTHER ARTICLES HANDLED BY PERSONS WHOSE HANDS HAVE BEEN IN DIRECT CONTACT WITH THE SOIL.

THE MECHANISMS OF EGG TRANSPORT ARE SIGNIFICANTLY INFLUENCED BY THREE FACTORS. (1) CARELESS HABITS OF CLEANLINESS. (2) THE SMALL SIZE OF THE EGG AND ITS ABILITY TO REMAIN INFECTIVE FOR MANY YEARS. EGGS HAVE REMAINED VIABLE AND INFECTIVE IN THE SOIL OF A HOME VEGETABLE GARDEN FOR 6 YEARS. (3) UNSANITARY SEWAGE DISPOSAL AND INEFFECTIVE SEWAGE TREATMENT. VIABLE EGGS HAVE SURVIVED MUNICIPAL SEWAGE TREATMENT AND HAVE BEEN DISCHARGED INTO A WATER SOURCE USED FOR CROP IRRIGATION.

DIAGNOSIS: EGGS RECOVERED FROM STOOL SPECIMENS USUALLY CONSTITUTE THE BASIS FOR DIAGNOSIS BECAUSE SYMPTOMS ALONE ARE NOT SUFFICIENTLY SPECIFIC. ADULT WORMS MAY BE RECOVERED AND IDENTIFIED AT AUTOPSY OR BE REVEALED BY BARIUM X-RAY, OR BE IDENTIFIED AFTER SPONTANEOUSLY LEAVING THE BODY.

TREATMENT: UNCOMPLICATED INFECTIONS RESPOND WELL TO DRUG THERAPY. IF REINFECTION IS PREVENTED, ADULT WORMS WILL DIE IN 6-24 MONTHS AND BE PASSED FROM THE BODY. IF ASCARIASIS IS SUSPECTED, A PHYSICIAN SHOULD BE CONSULTED.

PREVENTION: PERSONAL CLEANLINESS IS THE MOST IMPORTANT PREVENTATIVE. CHILDREN AT PLAY SHOULD BE SUPERVISED TO PREVENT THEM FROM DEFECATING IN THE PLAY AREA AND TO INSURE THAT THEY WASH THEIR HANDS AFTER PLAYING IN THE DIRT. PROPER SEWAGE DISPOSAL AND TREATMENT ARE IMPORTANT.

VEGETABLES OR FRUITS WHICH MAY HAVE BEEN FERTILIZED WITH HUMAN MANURE SHOULD BE DIPPED IN HOT WATER FOR 10 MINUTES AT 55-60 C (131-140 F) OR FOR 5 MINUTES IN AN AQUEOUS SOLUTION CONTAINING 100-120 PPM FREE IODINE AT 15-30 C (59-86 F). A SOLUTION OF 500 PPM WILL NOT AFFECT FLAVOR. WASHING WITH A DETERGENT MAY NOT COMPLETELY REMOVE EGGS FROM FRESH PRODUCE.

EGGS ARE RESISTANT TO DESICCATION, LOW TEMPERATURE, PUTREFACTION AND STRONG CHEMICALS. CONTAMINATED SOIL SHOULD BE TURNED UNDER AND STEAM-STERILIZED IF POSSIBLE AT 103 C (217 F) FOR 3 MINUTES OR LONGER.

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